

I claim:

1. A self-cleaning water purification apparatus for automatically creating pure distilled water for dispensing on demand, comprising:

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a housing;

an input tube connected to said housing, said input tube to be connected to a household tap water supply for receiving tap water;

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a distillation chamber disposed in said housing and communicating with said input tube for heating the tap water to a boiling temperature and producing vapors therefrom;

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a condenser disposed in said housing and communicating with said distillation chamber, said condenser condensing the vapors into a condensed liquid;

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a post-filter disposed in said housing and communicating with at least one of said distillation chamber and said condenser, said post-filter capturing impurities from the condensed vapors to produce pure distilled water in a distillation cycle, said post-filter having:

a filter material for filtering the condensed liquid; and

a post-filter heating element for superheating the water in said filter material to clean said filter material during a rejuvenation cycle;

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a reservoir disposed in said housing and communicating with at least one of said post filter and said condenser for holding a predetermined volume of the pure distilled water; and

a cleaning agent chamber containing a cleaning agent, said cleaning agent chamber

5 communicating with said distillation chamber and supplying a given amount of said cleaning agent to said distillation chamber for cleaning said distillation chamber in a cleaning cycle.

2. The apparatus according to claim 1, further comprising valves and sensors automatically controlling said distillation cycle, said cleaning cycle, and said rejuvenation cycle.

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3. The apparatus according to claim 2, further comprising a drain to the environment, said valves including:

a valve disposed between said input tube and said distillation chamber;

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a valve disposed between said distillation chamber and said condenser;

a valve disposed between said condenser and said reservoir;

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a valve disposed between said distillation chamber and said cleaning agent chamber;

a valve disposed between said post-filter and said drain;

a valve disposed between said condenser and said drain; and

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at least one valve disposed between said distillation chamber and said drain.

4. The apparatus according to claim 2, further comprising a drain to the environment, said valves including:

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a valve disposed between said input tube and said condenser;

a valve disposed between said distillation chamber and said condenser;

10 a valve disposed between said post-filter and said reservoir;

a valve disposed between said post-filter and said drain;

at least one valve disposed between said post-filter and said drain; and

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a valve disposed between said distillation chamber and the environment.

5. The apparatus according to claim 2, wherein said sensors include a sensor disposed in said distillation chamber detecting when the tap water in said distillation chamber has vaporized.

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6. The apparatus according to claim 2, wherein said valves are ceramic valves.

7. The apparatus according to claim 2, further comprising a float switch disposed in said reservoir, said float switch detecting a level of the pure distilled water in said reservoir and

25 controlling flow of the tap water into said distillation chamber dependent upon said level.

8. The apparatus according to claim 7, wherein said float switch interrupts subsequent distillation cycles until an amount of pure water is dispensed from said reservoir and lowers said level in said reservoir.

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9. The apparatus according to claim 8, further comprising a control device connected to said valves, said sensors, and said float switch for controlling and monitoring said valves during said distillation cycle, said cleaning cycle, and said rejuvenation cycle.

10 10. The apparatus according to claim 1, further comprising a diverter baffle fluidically connecting said distillation chamber and said condenser.

11. The apparatus according to claim 1, further comprising:

15 a water dispenser; and

a pump communicating with said dispenser and said reservoir, said pump delivering the pure distilled water under pressure from said reservoir to said dispenser.

20 12. The apparatus according to claim 11, further comprising a flavor agent chamber containing a flavor agent, said flavor agent chamber disposed between said reservoir and said dispenser for flavoring the pure distilled water dispensed to a user.

13. The apparatus according to claim 1, further comprising a flavor agent chamber
25 containing a flavor agent, said flavor agent chamber communicating with said reservoir for

flavoring the pure distilled water dispensed to a user.

14. The apparatus according to claim 1, wherein said flavor agent chamber has a fill port for filling said flavor agent chamber with said flavor agent.

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15. The apparatus according to claim 1, wherein said housing is shaped to be mounted at least one of under a countertop, under a cabinet, at a wall, and on a countertop.

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16. The apparatus according to claim 1, wherein said condenser fluidically connects said input tube to said distillation chamber.

17. The apparatus according to claim 1, wherein said filter material is activated carbon.

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18. The apparatus according to claim 1, wherein said post-filter captures impurities from the condensed vapors occurring at boiling temperatures lower than the boiling temperature of water.

19. A method for automatically creating pure distilled water for dispensing on demand and performing self-cleaning, which comprises:

automatically carrying out a distillation cycle by:

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filling a distillation chamber with tap water to a predetermined level;

heating the tap water in the distillation chamber until the tap water reaches a boiling temperature and, thereby, causes the tap water to vaporize;

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directing rising vapors through a condenser to cool and condense the vapors into a liquid state, and directing the liquid through a filter to remove and capture impurities therefrom and produce pure distilled water;

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directing the pure distilled water from the filter into a reservoir holding a predetermined volume of the pure distilled water for ready dispensing on demand;

automatically monitoring a level of the pure drinking water in the reservoir; and

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continuously re-activating the distillation cycle when the level drops below a given level to produce additional quantities of the pure distilled water and to automatically maintain the level at the given level and ceasing the distillation cycle when the level rises to the given level;

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periodically carrying out a cleaning cycle to at least one of release and break down deposits

and contaminants in the distillation chamber; and

periodically carrying out a filter rejuvenation cycle to release contaminants from the filter.

- 5 20. The method according to claim 19, which further comprises performing the periodic cleaning cycle by:

10 dispensing a given amount of cleaning agent from a cleaning agent reservoir into the distillation chamber and mixing the cleaning agent with at least some tap water in the distillation chamber;

15 heating the mixed tap water and cleaning agent with a water heating element to at least one of release and break down deposits and contaminants in the distillation chamber; and

 rinsing the distillation chamber to remove the deposits and the mixed tap water and cleaning agent from the distillation chamber.

- 20 21. The method according to claim 19, which further comprises performing the periodic filter rejuvenation cycle by:

 sealing off the filter;

25 activating a filter heating element to superheat water remaining in the filter and, thereby, release contaminants from the filter; and

unsealing the filter to remove the released contaminants therefrom.

22. The method according to claim 19, which further comprises performing the periodic

5 cleaning and rejuvenation cycles by:

dispensing a given amount of cleaning agent from a cleaning agent reservoir into the
distillation chamber and mixing the cleaning agent with at least some tap water in the
distillation chamber;

10 heating the mixed tap water and cleaning agent with a water heating element to at
least one of release and break down deposits and contaminants in the distillation
chamber;

rinsing the distillation chamber to remove the deposits and the mixed tap water and
15 cleaning agent from the distillation chamber;

sealing off the filter;

activating a filter heating element to superheat water remaining in the filter and,
20 thereby, release contaminants from the filter; and

unsealing the filter to remove the released contaminants therefrom.

23. The method according to claim 19, which further comprises controlling a sequence of the

25 distillation, wash, and rejuvenation cycles timed valves and sensors.

24. The method according to claim 19, which further comprises directing rising vapors through a diverter baffle to remove contaminants in the tap water.

5 25. The method according to claim 19, which further comprises:

carrying out the automatic monitoring by automatically monitoring a level of the pure drinking water in the reservoir with a float switch; and

10 re-activating the distillation cycle with the float switch.

26. The method according to claim 19, which further comprises delivering the pure distilled water under pressure from the containment reservoir to a dispenser.

15 27. The method according to claim 19, which further comprises automatically controlling a sequence separate cycles of the distillation cycle, the wash cycle, and the rejuvenation cycle with valves and sensors.

28. The method according to claim 19, which further comprises cooling the condenser by
20 filling the distillation chamber with the tap water.

29. The method according to claim 19, which further comprises adding a flavor agent to the pure distilled water prior to dispensing to a user.

30. A method for automatically creating pure distilled water for dispensing on demand and performing self-cleaning, which comprises:

providing an apparatus according to claim 1; and

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automatically carrying out the distillation cycle by:

filling the distillation chamber with tap water to a predetermined level;

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heating the tap water in the distillation chamber until the tap water reaches a boiling temperature and, thereby, causes the tap water to vaporize;

directing rising vapors through the condenser to cool and condense the vapors into a liquid state, and directing the liquid through the filter to remove and capture

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impurities therefrom and produce pure distilled water;

directing the pure distilled water from the filter into the reservoir holding a predetermined volume of the pure distilled water for ready dispensing on demand;

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automatically monitoring the level of the pure drinking water in the reservoir;

continuously re-activating the distillation cycle when the level drops below a given level to produce additional quantities of the pure distilled water and to automatically maintain the level at the given level and ceasing the distillation cycle when the level

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rises to the given level;

periodically carrying out the cleaning cycle to at least one of release and break down deposits and contaminants in the distillation chamber; and

- 5 periodically carrying out the filter rejuvenation cycle to release contaminants from the filter.